

WHAT IS CLAIMED IS:

1. A pilot valve for operating a hydraulically-actuated main valve, the main valve selectively passing fluid from a main valve supply port to a main valve function port to supply fluid pressure to operate one or more component functions, the pilot valve  
5 comprising:
  - a seal carrier defining a carrier surface, a carrier supply port passing through the carrier surface, and a carrier function port in communication with the carrier supply port and passing through the carrier surface;
  - a seal plate defining a planar sealing surface spaced from and facing the carrier  
10 surface to define a spacing, a plate supply port passing through the planar sealing surface, and a plate function port passing through the planar sealing surface and passing pressurized fluid to actuate the main valve;
  - a supply seal sealing between the carrier supply port and the plate supply port;
  - a function seal sealing with the carrier function port and slidably sealing with the planar  
15 sealing surface;
  - the seal carrier rotatable relative to the seal plate about an axis of rotation between an active position and an inactive position, the carrier supply port and the plate supply port being substantially centered about the axis of rotation to remain in sealed fluid communication during said rotation, the carrier function port and plate function port being  
20 radially spaced from the axis of rotation and positioned such that in the active position the carrier function port is generally aligned and sealed with the plate function port to pass fluid to actuate the main valve, and in the inactive position the carrier function port is spaced from

the plate function port and is closed off by the sealing surface; and

an electrically powered prime mover for rotating the seal carrier between the active and inactive positions.

2. A pilot valve as defined in Claim 1, wherein the function seal further  
5 comprises:

a function seal sleeve having a carrier end sealed with the carrier function port and a plate end extending to and in slidable sealing engagement with the planar sealing surface of the seal plate.

3. A pilot valve as defined in Claim 2, wherein the plate end of the function seal  
10 sleeve seals with the planar sealing surface with a metal-to-metal sealing.

4. A pilot valve as defined in Claim 2, wherein the function seal further comprises:

an elastomer seal adjacent the carrier end of the function seal sleeve, the elastomer seal sealing between the function seal sleeve and the carrier function port and urging the  
15 function seal sleeve toward the seal plate.

5. A pilot valve as defined in Claim 1, further comprising:

a plurality of ball bearings axially supporting the seal plate to reduce rotational friction.

6. A pilot valve as defined in Claim 1, further comprising:

a plate vent port in communication with the spacing between the planar sealing surface and the carrier surface, such that in the inactive position, the plate function port vents to the plate vent port.

5 7. A pilot valve as defined in Claim 1, wherein the main valve supply port is in fluid communication with the plate supply port, such that the pilot valve and main valve share a common fluid source.

8. A pilot valve as defined in Claim 1, wherein the supply seal further comprises:

10 a supply seal sleeve having a carrier end sealed with the carrier supply port and a plate end extending to and in slidable sealing engagement with the planar sealing surface of the seal plate.

9. A pilot valve as defined in Claim 8, wherein the supply seal further comprises:

15 an elastomer seal surrounding the carrier end of the supply seal sleeve, the elastomer seal sealing between the supply seal sleeve and the carrier supply port and urging the supply seal sleeve toward the seal plate.

10. A pilot valve as defined in Claim 1, wherein the prime mover comprises:

a rotary solenoid.

11. A pilot valve for operating a hydraulically-actuated main valve, the main valve selectively passing fluid from a main valve supply port to a main valve function port to supply fluid pressure to operate one or more component functions, the pilot valve  
5 comprising:

a seal carrier defining a carrier surface, a carrier supply port passing through the carrier surface, and a carrier function port in communication with the carrier supply port and passing through the carrier surface;

a seal plate defining a planar sealing surface spaced from and facing the carrier  
10 surface to define a spacing, a plate supply port passing through the planar sealing surface, and a plate function port passing through the planar sealing surface and passing pressurized fluid to actuate the main valve;

a supply seal sealing between the carrier supply port and the plate supply port;  
a function seal including a function seal sleeve having a carrier end and a plate end, an  
15 elastomeric seal adjacent the carrier end of the function seal sleeve to seal between the function seal sleeve and the carrier function port and urge the function seal sleeve toward the seal plate, the plate end extending to and in slidable metal-to-metal sealing engagement with the planar sealing surface of the seal plate;

the seal carrier rotatable relative to the seal plate about an axis of rotation between  
20 an active position and an inactive position, the carrier supply port and the plate supply port being substantially centered about the axis of rotation to remain in sealed fluid

communication during said rotation, the carrier function port and plate function port being radially spaced from the axis of rotation and positioned such that in the active position the carrier function port is generally aligned and sealed with the plate function port to pass fluid to actuate the main valve, and in the inactive position the carrier function port is spaced from the plate function port and is closed off by the sealing surface; and  
5 an electrically powered prime mover for rotating the seal carrier between the active and inactive positions.

12. A pilot valve as defined in Claim 11, further comprising:  
a plate vent port in communication with the spacing between the planar sealing  
10 surface and the carrier surface, such that in the inactive position, the plate function port vents to the plate vent port.

13. A pilot valve as defined in Claim 11, wherein the supply seal further comprises:  
a supply seal sleeve having a carrier end sealed with the carrier supply port and a  
15 plate end extending to and in slidable sealing engagement with the planar sealing surface of the seal plate.

14. A valve assembly comprising:  
a main valve body;  
a movable main valve element engageable with a main valve seat;

a reciprocating, hydraulically-actuated main valve actuator for moving the main valve element to selectively pass fluid through the main valve body between a main valve supply port and a main valve function port, the main valve function port passing fluid pressure to operate one or more component functions;

- 5           a seal carrier defining a carrier surface, a carrier supply port passing through the carrier surface, and a carrier function port in communication with the carrier supply port and passing through the carrier surface;

- a seal plate defining a planar sealing surface spaced from and facing the carrier surface to define a spacing, a plate supply port passing through the planar sealing surface,  
10       and a plate function port passing through the planar sealing surface and for selectively passing pressurized fluid to actuate the main valve actuator;

          a supply seal sealing between the carrier supply port and the plate supply port;  
          a function seal sealing with the carrier function port and slidably sealing with the planar sealing surface;

- 15           the seal carrier rotatable relative to the seal plate about an axis of rotation between an active position and an inactive position, the carrier supply port and the plate supply port being substantially centered about the axis of rotation to remain in sealed fluid communication during said rotation, the carrier function port and plate function port being radially spaced from the axis of rotation and positioned such that in the active position the  
20       carrier function port is generally aligned and sealed with the plate function port to pass fluid to actuate the main valve actuator, and in the inactive position the carrier function port is spaced from the plate function port and is closed off by the sealing surface; and

an electrically powered prime mover for rotating the seal carrier between the active and inactive positions.

15. A valve assembly as defined in Claim 14, further comprising:

the main valve supply port being in fluid communication with the plate supply port,  
5 such that a common fluid source supplies fluid actuating the main valve and fluid passing through the main valve body.

16. A pilot valve as defined in Claim 14, further comprising:

a plurality of ball bearings axially supporting the seal plate to reduce rotational friction.

10 17. A pilot valve as defined in Claim 14, further comprising:

a plate vent port in communication with the spacing between the planar sealing surface and the carrier surface, such that in the inactive position, the plate function port vents to the plate vent port.

15 18. A pilot valve as defined in Claim 14, wherein the function seal further comprises:

a function seal sleeve having a carrier end sealed with the carrier function port and a plate end extending to and in slidable metal-to-metal sealing engagement with the planar sealing surface of the seal plate.

19. A pilot valve as defined in Claim 14, further comprising:

an actuator biasing member for biasing the main valve actuator to close off flow between the main valve supply port and the main valve function port.

20. A pilot valve as defined in Claim 19, further comprising:

5 an actuator cavity for housing the actuator biasing member, the actuator cavity including an actuator vent port in communication with the spacing between the seal carrier and the seal plate.